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All of the mice are interested in little "ferris wheels" in which they spin and ride by the hour, getting their exercise and much evident enjoyment from them. Even the little pocket mice, usually so quiet, become enthusiastic, spinning their wheel.

We have learned much that is new to us of their habits, dispositions, tastes, voices, calls, signals, hours of work and play, sleep, nest-building, sanitation and general home-making. Their time and manner of molt have been carefully noted. Their breeding habits are still to be studied. The only trouble is for busy people to get time enough to watch them, but there are many who need just such occupation and would greatly enjoy it. I hope to see a large number of people started in this kind of study, the results of which will be far-reaching in practical knowledge of our numerous species of small mammals.

Biological Survey, Washington, D. C.

THE MAMMALS OF ITASCA COUNTY, MINNESOTA

BY ALVIN R. CAHN

Itasca County, one of the largest of the Minnesota counties, lies in the north central part of the state, Koochiching County intervening between it and the Canadian boundary. Sparsely settled, with few cities of any size, the county retains a considerable variety of primitive qualities, though lumbering years ago and frequent forest fires have done much to ruin an otherwise ideal environment. A myriad of lakes, countless small streams and sphagnum bogs, hemmed in and surrounded by pine woods, however, still shelter and protect an abundance of animal life.

Yet this county, like so many of the unsettled regions of the north, is doomed in the not far distant future to undergo great changes. Further lumbering, clearing of land, homesteading, and road building will open up what is now almost inaccessible territory, and these developments will of course exert great influence upon the wild life of the region. The transition from the primitive conditions of the woods to their present state has led to the total extinction of several mammals, and to the reduction of others almost to the point of extermination. Further change will stamp out these latter and greatly reduce other species.

It seemed advisable, when the opportunity presented itself, to investigate the vertebrate fauna of this region before further changes occurred. This chance came to the writer during the last half of July and in August, 1919. During this period much of the county was covered, and the results of that portion of the investigation relating to mammals are herewith presented. A report on the avifauna of the county has been published elsewhere.¹

The data upon which this paper is based are from two sources: personal investigation, and information furnished the writer by Mr. George Dwigans, a woodsmen who has spent years within the county, and who is perfectly familiar with its big game. The investigation was made possible through the kindnesses of Dr. Sydney Kuh, who has a cabin in the heart of the county, and to him the writer expresses his appreciation.

A list of the mammals of Itasca County follows.

1. Northern Virginia Deer. *Odocoileus americanus borealis* Miller.—Still reasonably common throughout the county. The great areas available for its habitation—including a considerable amount of forest and game preserve—together with the scanty settlement of large sections of the county are conducive to the welfare of the species. In spite of the fact that the deer are relatively undisturbed during most of the year, they are shy and suspicious as compared with those found in northern Michigan and Wisconsin. However, during the early summer, deer visited the vegetable garden near the cabin almost nightly, as disclosed next morning by the tracks in the soft earth. On the morning of August 1, Doctor Kuh and Mr. Jacobsen surprised a doe and two fawns on the road near Lawrence Lake (Prairie River) and their automobile came within a few inches of running one down.

2. Moose. *Alces americanus* Jardine.—Rapidly nearing extinction in Itasca County, and very seldom seen. The species is probably more of a migrant from the country to the north and west than a permanent resident within the county. During the early summer—June, 1919—the tracks of a large sized moose were found one morning traversing Doctor Kuh's garden on Lake Minnewanka, an incident which has occurred several times during previous years. Doctor Kuh has the mounted head of a bull which was killed during the hunting season in 1911. If the moose is to be saved anywhere outside of forest and game preserves, it is high time that it be protected to the full power of the law. The moose is about to be added to the list of animals that *formerly* inhabited the county, to which list already belong the caribou, elk, fisher and marten.

3. Canada Lynx. *Lynx canadensis canadensis* Kerr.—Because of its secretive habits, the lynx is very seldom seen. It occurs, however, throughout the county, and is quite often taken by trappers during the winter months. During August,

¹ Cahn, A. R., Bird Notes from Itasca County, Minnesota. Wilson Bull., vol. 32, no. 4, pp. 103-122. December, 1920.

1917, Mr. Dwigans and party "spotted" a fine specimen on Lake Elizabeth. Confused by the light, the lynx permitted the canoe to approach within ten feet. The animal was on the ground, and had evidently come to the lake to drink.

4. Wild Cat. *Lynx rufus rufus* (Güldenstädt).—The writer has, unfortunately, little information to offer regarding this species. It occurs sporadically throughout the county, but in no considerable numbers.

5. Domestic Cat. *Felis catus* Linn.—Included in this list because there are a great many "house" cats that have taken to the woods, where they spend all their time. These animals are self-sufficient; they are essentially wild, as they can not be approached, and are dependent entirely upon their own wits and skill for their subsistence.

6. Timber Wolf. *Canis nubilus* Say.—Still fairly common within the county, but greatly reduced in numbers over former years. Although it is heard occasionally, the timber wolf is rarely seen during the summer. During the winter, however, so Mr. Dwigans tells me, it is frequently seen in clearings and crossing the frozen lakes. As the species travels considerably in winter, it is altogether likely that there is an influx of wolves during the cold weather.

7. Brush Wolf. *Canis latrans* Say.—This smaller wolf—never, by the way, called "coyote" in the north woods—is considerably more common than its larger relative, and is distributed throughout the county. Seldom seen in the summer, but heard by the writer during the night on many occasions.

8. Red Fox. *Vulpes fulva* (Desmarest).—The red fox, once rather common in Itasca County, must now be considered rare. The writer found no evidence of its presence, but during the last few years Mr. Dwigans has taken several very fine specimens within the territory under discussion. Of the color phases of the red fox, two have been taken: the cross fox, and the silver fox. As these phases are considered by the natives to be distinct species, a word regarding them may not be out of place. The silver or black form is the dark phase of the red fox; the cross fox is intermediate between the red and the silver. Both are, then, merely individual color phases of the red fox. "In a litter of fox cubs born of red parents, perhaps there may be a silver. On the other hand, one or more of the cubs of a silver vixen are quite certain to be red."² Under domestication this tendency of silvers to throw red cubs can be overcome by selective and careful breeding.

9. Northern Black Bear. *Ursus americanus americanus* Pallas.—Very nearly extinct in Itasca County. Those individuals that remain are so wary that they are very seldom seen. However, tracks and signs are met with occasionally, and no doubt the forest preserves and the more inaccessible places still hold their occasional bear. Although the black bear is by all odds the most common, the cinnamon phase is not unknown. Doctor Kuh has a very beautiful pelt of a brown bear taken near his cabin a few years ago. The black bear is another of the mammals that will not long survive within the county unless rigidly protected.

10. Raccoon. *Procyon lotor lotor* (Linn.).—Somewhat more common in Itasca County than the following species, but still a rare animal in the county, being

² Dearborn, Ned, The Domesticated Silver Fox. Farmers Bull. no. 795, U. S. Dept. of Agr., p. 4, March, 1917.

seen and taken only occasionally. Doctor Kuh has the skins of several racoons taken in the vicinity of Lake Minnewanka, and all are typical in size, color and markings.

11. Badger. *Taxidea taxus taxus* (Schreber).—The badger must now be considered very rare in Itasca County, and is rapidly approaching extinction in this area. Once not uncommon, it is now almost unknown. At Ely the writer found a skin of this animal that was taken within Itasca County during October of 1918, but the exact locality—other than that it came from the northwestern section—could not be ascertained. Mr. Dwigans has taken the animal several times in the county.

12. Canadian Otter. *Lutra canadensis canadensis* (Schreber).—Common throughout the county, and steadily and rapidly increasing in numbers. Along the shores of Beaver Lake "otter runs" were in evidence. Several individuals were seen in Lake Minnewanka during the writer's stay, and on the shore of Rice Lake five old signs were found, all being 100 per cent crayfish remains. With the otter as common as it is in Itasca County, it would not be amiss to open the trapping season for two years. If opened, however, the situation should be carefully watched by the game warden department and by competent observers, and closed again at the end of that period if conditions warrant.

13. Mink. *Mustela vison letifera* Hollister.—Common throughout the county, frequenting the lakes and rivers, where it feeds largely upon crayfish, frogs and some of the smaller shore fishes. Successfully trapped during the open season; the fur is of high grade both in quality and in color.

14. Least Weasel. *Mustela rixosa rixosa* (Bangs).—This little weasel (length about 6½ inches), easily recognized by the absence of the black tip on the tail, is relatively common in spots, and is apparently local in distribution. Two individuals were seen on August 14 near Cedar Lake.

15. Short-tailed Weasel. *Mustela cicognanii cicognanii* Bonaparte.—Considerably larger than the preceding (length about 12 inches), this weasel is told at a glance by the always present black tip of the tail. Several skins were seen at Ely, and one live individual was seen on July 30 at Lake Minnewanka. It seems possible that the long-tailed weasel (*Mustela longicauda spadix* Bangs) may occur occasionally, though this area probably is about the northern limit of the species. The writer was told that occasionally a much larger weasel, with a black tipped tail, is taken, which may well be this larger species.

16. Skunk. *Mephitis hudsonica* (Richardson).—Abundant throughout the county, and often in evidence. During the summer of 1919, one of these animals insisted on living under the cabin floor, much to the joy of Bubbles, the family "badger dog," who persisted in his endeavors to dig it out. These performances were unsuccessful in many ways, and were unpleasant particularly because Bubbles usually became interested about meal time. Every evening after dark the skunk wandered down to the garbage dump, and we could hear him rattling around for several hours. It is interesting to note that the dominant form is the "full stripe," and Mr. Dwigans assures me that he has not had any "black" specimens among the many skunks which he has taken.

17. Minnesota Varying Hare. *Lepus americanus phæonotus* Allen.—The only rabbit of which the writer could get any trace was the big "white rabbit" or "snow-shoe." This interesting form is common, and was seen frequently during

rambles through the woods, and along the roadside when traveling by machine at night. Some species of cotton-tail is present, but no specimen was procurable for identification.

18. Red-Squirrel. *Sciurus hudsonicus hudsonicus* (Erxleben).—Common everywhere in the woods and about the towns. The oak trees furnish the chief item of food for the species, though the hazelnut (*Corylus* sp.) is common enough to be of some use. Young were seen playing about the nest on July 21.

19. Lake Superior Chipmunk. *Eutamias quadrivittatus neglectus* (Allen).—Two species of chipmunks are found within the county, of which this is the more common. Found everywhere through the wooded areas where it feeds upon any available nuts. Unlike the next species, this little fellow shows a marked inclination to climb.

20. Gray Chipmunk. *Tamias striatus griseus* Mearns.—Quite common throughout the county, both in the hardwood and evergreen thickets. Found co-existent with the preceding species, and both seem to show a preference for the hardwoods. This species shows a decided preference for the ground, and is seldom found "up a stump." Food consists of berries and nuts. Called the "gray" chipmunk because of the gray tinge of the upper parts.

21. Gopher. *Citellus tridecemlineatus* (Mitchill).—Rare in the cleared lands, but found occasionally in the cultivated areas about the towns and farms. This county probably represents about the northern and eastern limit of the species in the state.

22. Woodchuck. *Marmota monax canadensis* (Erxleben).—Quite common throughout the county and often seen, either in the clearings or along the roads. A woodchuck took up his residence under the cabin floor, but departed hurriedly when the family—and Bubbles—arrived. This hole was quickly—and permanently—occupied by the afore-mentioned skunk.

23. Flying Squirrel. *Glaucomys sabrinus sabrinus* (Shaw). The flying squirrels are always very little in evidence, and unless special search is made their presence would never be suspected. This species is relatively common throughout the county, both in the woods and about the homesteads and towns.

24. Porcupine. *Erethizon dorsatum dorsatum* (Linn.).—Common throughout the county in all suitable places, yet not nearly as common as the writer found the species either in northern Wisconsin or in northern Michigan. This is, of course, not to be regretted, for the animal does a large amount of damage. Prefers the hardwood thickets, and feeds largely on the top-most branches of the ash (*Fraxinus americanus*) and the aspen (*Populus tremuloides*). Along the lake shores it feeds upon the succulent stems and roots of the arrow-heads (*Sagittaria* sps.) and the white water lily (*Castalia odorata*).

25. Beaver. *Castor canadensis michiganensis* Bailey.—Very nearly exterminated within the county limits. The writer saw but a single colony, apparently healthy and in a thriving condition, on Beaver Lake. The house here was of good size, and of the shore-line type, with the entrance in about eighteen inches of water. Evidence of activity was found in well worn log-shoots, and in a small ash (*Fraxinus americanus*) cut the night before. Until a year ago (the fall of 1918) there was a colony of two small houses in Rat Creek, between Little and Big Rat Lakes. Here a dam had been built, which seriously damaged fourteen tons of good hay belonging to a homesteader. Now the beaver—and

a part of the dam—are gone: the conclusions are obvious. There is another colony, which the writer did not visit, on McCabe Lake, just north of Beaver Lake, and so far as the data go, these are the only two colonies in the county.

26. Muskrat. *Ondatra zibethica zibethica* (Linn.).—Common throughout the county wherever there are suitable conditions, but surprisingly little in evidence as compared with northern Wisconsin and northern Michigan. Seen swimming in Lake Minnewanka, in Cedar, and Rice Lakes, as well as in many of the small unnamed lakes, and heard splashing almost every night. Several houses were seen, though none was of considerable size.

27. Meadow Mouse. *Microtus pennsylvanicus* (Ord).—Abundant throughout the county, and seen usually as a dark moving object in the leafy underbrush. The species is more active at night than in the day time. An individual of the species was seen crawling about on a pile of drifting wood in the locks where the Mississippi River leaves Lake Winnibigoshish. Evidence of damage to young fruit trees was common in new orchards.

28. Norway Rat. *Rattus norvegicus* (Erxleben).—Found commonly about the homesteads and in the towns, and probably quite local in distribution. However, it mysteriously appears upon the scene shortly after a house is built, probably being transported with the lumber or boxes.

29. House Mouse. *Mus musculus* Linn.—Common about the homesteads and in the towns.

30. Northern Deer Mouse. *Peromyscus maniculatus gracilis* (LeConte).—This beautiful rodent is very common throughout the county, and is frequently seen both in the woods and about the houses, in which it makes itself perfectly at home. Gets into the food supply, but does no serious damage.

31. Jumping Mouse. *Zapus hudsonius* (Zimm.).—The writer is unable to offer any information as to the abundance of this species in the county, but its occurrence is undoubtedly. A skin found at Ely was taken within the county in July, 1917, and the presence of the species is known generally to those familiar with the smaller animals of the region.

32. Short-tailed Shrew. *Blarina brevicauda brevicauda* (Say).—Seen by the writer only once; little information can be offered at the present time as to the abundance of the species.

33. Common Shrew. *Sorex personatus personatus* St. Hilaire.—A single specimen of this little shrew was found in the woods under a pile of cut logs, near Lake Minnewanka, on August 12. The animal measured 84 mm., and the stomach contents were entirely cricket remains.

34. Richardson's Shrew. *Sorex richardsoni* Bach.—Two shrews of this species were found, one dead near the cabin, and another brought in by Bubbles. They measured 110.5 mm. and 114 mm. respectively.

35. Marsh Shrew. *Neosorex palustris* (Rich.).—This, the largest of the shrews found, is recorded from a single specimen caught in a swamp near Cedar Lake, and from another seen at Balsam Lake. The former measured 151.5 mm.

36. Say's Bat. *Myotis subulatus subulatus* (Say).—This bat is very common everywhere in the county, and is found both in the woods and around the homesteads.

37. Little Brown Bat. *Myotis lucifugus lucifugus* (LeConte).—One of these bats was taken and two more seen, all near camp on Lake Minnewanka. The

two were seen almost every evening, beginning their twilight excursions about seven o'clock.

38. Red Bat. *Nycterus borealis borealis* (Müller).—Several were seen on August 8, between Bovey and camp. The stomach of one examined contained unidentifiable insect remains, mostly Diptera.

EXTERMINATED MAMMALS

The following species of mammals are known to have existed in Itasca County within the last fifteen or twenty years, but the writer is unable to offer any data whatsoever that would indicate that they are at present to be found therein.

1. Woodland Caribou. *Rangifer caribou sylvestris* (Rich.).—Formerly present, though it is doubtful if the type of country is such as to have attracted the species in any great numbers. Reported by Herrick³ from the St. Louis River (which is in St. Louis County) a few miles east of Itasca County.

2. American Elk. *Cervus canadensis canadensis* Erxleben.—Never really common in Itasca County, owing to the fact that it is a forested country. Reported by Herrick⁴ as common from Lake Itasca (in Clearwater County, about 35 miles west of Itasca County) in 1885. There are no records of either species within the last fifteen years.

3. Marten. *Martes americana americana* (Turton).—Disappeared, apparently, soon after the caribou and elk. It is possible that an occasional marten may still be caught as a wanderer from another part of the coniferous area.

4. Fisher. *Martes pennanti pennanti* (Erxleben).—The most recent of the exterminated mammals, and there is a bare possibility that it may still exist, though the writer can find no recent records of its presence. Like the marten, probably a wanderer from adjacent territory.

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³ Herrick, C. L., Mammals of Minnesota. Geol. & Nat. Hist. Surv. of Minn., Bull. 7, 1892, p. 277.

⁴ Herrick, C. L., ibid., p. 280.